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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/911,731	07/25/2001	Tatsuya Kawahara	77661/54	5591

23838 7590 02/10/2004

KENYON & KENYON  
1500 K STREET, N.W., SUITE 700  
WASHINGTON, DC 20005

EXAMINER

CREPEAU, JONATHAN

ART UNIT	PAPER NUMBER
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1746

DATE MAILED: 02/10/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

## Office Action Summary

Application No.

09/911,731

Applicant(s)

KAWAHARA ET AL.

Examiner

Jonathan S. Crepeau

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 19 December 2003.
- 2a) ☒ This action is FINAL. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-11 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-11 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. §§ 119 and 120

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
a) ☐ All b) ☐ Some \* c) ☐ None of:  
1. ☐ Certified copies of the priority documents have been received.  
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.  
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).  
\* See the attached detailed Office action for a list of the certified copies not received.
- 13) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application) since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.  
a) ☐ The translation of the foreign language provisional application has been received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121 since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.

### Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892) 4) ☐ Interview Summary (PTO-413) Paper No(s). \_\_\_\_\_
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948) 5) ☐ Notice of Informal Patent Application (PTO-152)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) \_\_\_\_\_ 6) ☐ Other: \_\_\_\_\_

## **DETAILED ACTION**

### ***Response to Amendment***

1. This Office action addresses claims 1-11. The claims remain rejected for the reasons of record. Accordingly, this action is made final.

### ***Claim Rejections - 35 USC § 102***

2. Claims 1 and 3 are rejected under 35 U.S.C. 102(b) as being anticipated by WO 96/24958. Regarding claim 1, the reference is directed to a solid polymer fuel cell (see abstract). The fuel cell includes an electrode comprising a catalyst layer (14) and a diffusion layer (11) (see Figure 1). Regarding claims 1 and 3, the catalyst layer has a structure wherein catalyst-containing zones are alternated in a stepwise manner in a flow direction with non-catalyst-containing zones (see abstract; Figure 3). The upstream (i.e., uncatalyzed) zone prevents drying up of the fuel cell, and the downstream (i.e., catalyzed) zone prevents flooding (see page 5, lines 27-31).

Thus, the instant claims are anticipated.

### ***Claim Rejections - 35 USC § 103***

3. Claims 1-11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Wilkinson et al (U.S. Pre-Grant Publication No. 2003/0082432).

Regarding claim 1, the reference teaches a polymer electrolyte fuel cell in paragraphs 4 and 36. The fuel cell includes an electrode (40) comprising a catalyst layer (45) and a substrate (diffusion layer) (42) (see Figure 1). Regarding claims 9 and 10, the porosity (pore amount) and pore size of the substrate increase as the substrate is traversed in-plane in a downstream flow direction (see claims 9 and 10 of the reference). Regarding claims 9, 10 and 11, the substrate may comprise a water repellent layer which may increase or decrease in hydrophobicity as the substrate is traversed in the flow direction (see paragraph 25). Regarding claim 11, the water repellent layer may comprise particulate carbon and PTFE and may change compositionally as the substrate is traversed in the flow direction (see paragraph 25). Regarding claim 6, the upstream structure of the diffusion layer would inherently function to prevent drying of the cell, and the downstream structure of the diffusion layer would inherently function to prevent flooding of the cell. Regarding claims 4 and 5, the loading of the electrocatalyst metal may be varied as the catalyst layer is traversed in-plane (see paragraph 44; claim 18 of the reference). Regarding claims 2, 3, 7 and 8, the structures of both the catalyst layer and the gas diffusion layer may vary in a step-wise or gradual manner (see Figs. 4a-4c).

While the reference teaches that the loading of the electrocatalyst metal may be varied as the catalyst layer is traversed in-plane, the reference does not expressly teach that the pore size or pore amount in the catalyst layer are varied in-plane, as recited in claims 4 and 5, or that the catalyst layer has a structure whereby the upstream portion prevents drying of the fuel cell and the downstream portion prevents flooding of the fuel cell, as recited in claim 1.

However, the invention as a whole would have been obvious to one of ordinary skill in the art at the time the invention was made because the disclosure of Wilkinson et al. would give the artisan sufficient guidance to ascertain that the pore size and pore amount in the catalyst layer of the reference are varied as the layer is traversed in-plane, as recited in claims 4 and 5. As is known to a skilled artisan, the "catalyst loading" disclosed by the reference refers to the amount (i.e., mass) of catalyst per unit area of surface. Since it may reasonably be assumed that the thickness of the catalyst layer is constant, a catalyst loading which decreases in the flow direction would mean that the catalyst layer would contain less and less material, and therefore would become progressively less dense. Hence, the pore volume and/or pore size between the catalyst particles would progressively increase. Thus, the subject matter recited in parts (2) and (3) of claims 4 and 5 would be rendered obvious to a skilled artisan. Regarding claim 1, the upstream structure of the catalyst layer would function to prevent drying of the cell, and the downstream structure of the catalyst layer would function to prevent flooding of the cell.

#### *Response to Arguments*

4. Applicant's arguments filed December 19, 2003 have been fully considered but they are not persuasive. Regarding the WO '958 reference, Applicants assert that this reference does not disclose the prevention of drying up of a cell or the prevention of flooding of a cell. However, it is submitted that these limitations are recited functionally in instant claim 1, and the structure of WO '958 is capable of performing these functions. Instant claim 3 specifies that "the structure

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of the catalyst layer varies in a step-wise manner,” which is disclosed in Figure 3 of the ‘958 reference. While features of an apparatus may be recited either structurally or functionally, claims directed to an apparatus must be distinguished from the prior art in terms of structure rather than function. *In re Schreiber*, 128 F.3d 1473, 1477-78, 44 USPQ2d 1429, 1431-32 (Fed. Cir. 1997). See also MPEP §2114. Applicants also assert that in WO ‘958, “it is not the catalyst layer proper, but the non-catalyst portions that allow water management.” While it is generally agreed that the areas not provided with catalyst allow for water management, it is submitted that these areas are part of a “catalyst layer” as a whole, albeit a noncontiguous one. The claims do not recite or imply that catalyst must be present in a continuous manner across the surface of the layer. Thus, the noncontiguous layer of WO ‘958 meets instant claim 1.

With regard to Wilkinson et al., Applicants assert that “nothing in Wilkinson et al. suggests the prevention of a drying up of a cell, or the prevention of flooding of the cell.” However, it is the Examiner’s position that Wilkinson et al. do in fact fairly suggest this subject matter. As set forth in the rejection above, the artisan would be able to ascertain, via the disclosure of catalyst loading, that the pore volume and/or pore size between the catalyst particles would progressively increase in a downstream direction. This is structurally indistinguishable from the subject matter recited in instant claims 4 and 5. Hence, the structure of Wilkinson et al. would be capable of performing the specified functions of preventing drying up of a cell or preventing flooding of the cell. As stated above, the claims must be distinguished over the prior art in terms of structure rather than function.

*Conclusion*


5. THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jonathan Crepeau whose telephone number is (571) 272-1299. The examiner can normally be reached Monday-Friday from 9:30 AM - 6:00 PM EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Randy Gulakowski, can be reached at (571) 272-1302. The phone number for the organization where this application or proceeding is assigned is (571) 272-1700. Documents may be faxed to the central fax server at (703) 872-9306.

Jonathan Crepeau  
Patent Examiner  
Art Unit 1746  
January 29, 2004

  
BRUCE F. BELL  
PRIMARY EXAMINER  
GROUP 1746